

RD-A149 102

GUIDE TO HUMAN FACTORS INFORMATION SOURCES(U) HUMAN  
ENGINEERING LAB ABERDEEN PROVING GROUND MD T J WANG  
NOV 84

1/1

UNCLASSIFIED

F/G 5/5

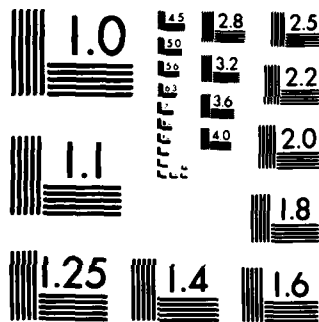
NL

END

614 M. J. Griffin

DTK





MICROCOPY RESOLUTION TEST CHART  
NATIONAL BUREAU OF STANDARDS-1963-A

Ad

# GUIDE TO HUMAN FACTORS INFORMATION SOURCES

AD-A149 102

Theodore J. Wang  
Andrulis Research Corporation  
Bethesda, MD 20014

NOVEMBER 1984  
AMCIMS Code 612716 H700014

Approved for public release;  
distribution unlimited.

DEC 31 1984

U. S. ARMY HUMAN ENGINEERING LABORATORY

Aberdeen Proving Ground, Maryland

013

no longer needed,  
the originator.

This report are not to be construed as an official Department  
document unless so designated by other authorized documents.

Nothing in this report does not constitute an official endorsement  
or use of such commercial products.

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
1. REPORT NUMBER	2. GOVT ACCESSION NO.	3. RECIPIENT'S CATALOG NUMBER
4. TITLE (and Subtitle) GUIDE TO HUMAN FACTORS INFORMATION SOURCES		5. TYPE OF REPORT & PERIOD COVERED Final
		6. PERFORMING ORG. REPORT NUMBER
7. AUTHOR(s) Theodore J. Wang Andrulis Research Corporation		8. CONTRACT OR GRANT NUMBER(s)
9. PERFORMING ORGANIZATION NAME AND ADDRESS Andrulis Research Corporation Bethesda, MD 20014		10. PROGRAM ELEMENT, PROJECT, TASK AREA & WORK UNIT NUMBERS AMCMS Code 612716.H700011
11. CONTROLLING OFFICE NAME AND ADDRESS		12. REPORT DATE November 1984
		13. NUMBER OF PAGES 38
14. MONITORING AGENCY NAME & ADDRESS (if different from Controlling Office) US Army Human Engineering Laboratory Aberdeen Proving Ground, MD 21005-5001		15. SECURITY CLASS. (of this report) Unclassified
		15a. DECLASSIFICATION/DOWNGRADING SCHEDULE
16. DISTRIBUTION STATEMENT (of this Report) Approved for public release; distribution unlimited.		
17. DISTRIBUTION STATEMENT (of the abstract entered in Block 20, if different from Report)		
18. SUPPLEMENTARY NOTES <i>Include Literature search</i>		
19. KEY WORDS (Continue on reverse side if necessary and identify by block number) Human Factors <i>Search Categories</i> Information Sources <i>Research Centers</i> Literature Search <i>Computer Search, and</i> <i>Manual Search.</i>		
20. ABSTRACT (Continue on reverse side if necessary and identify by block number) This guide shows how to search for literature relating to human factors. Manual and machine procedures are discussed in detail. Attention is directed to the development and location of sources of human factors expository material and human factors quantitative data.		

AMCMS Code 612716.H700011

Accession For	
NTIS GRA&I	<input checked="checked" type="checkbox"/>
DTIC TAB	<input type="checkbox"/>
Unannounced	<input type="checkbox"/>
Justification	
By	
Distribution/	
Availability Codes	
Dist	Avail and/or Special
A/1	



GUIDE TO HUMAN FACTORS  
INFORMATION SOURCES

Theodore J. Wang  
Andrulis Research Corporation  
Bethesda, MD 20014

November 1984

APPROVED:

  
JOHN D. WEISZ

Director  
US Army Human Engineering Laboratory

US ARMY HUMAN ENGINEERING LABORATORY  
Aberdeen Proving Ground, Maryland 21005-5001

Approved for public release;  
distribution unlimited.

#### ACKNOWLEDGEMENTS

I would like to acknowledge the following people for their assistance in preparing this report: Georgette Dorn, Elsie Cerutti, Elizabeth Hough, Estelle Alexander, and the entire reference staff of the National Library of Medicine. Thanks are also extended to John F. Price, Martha E. Williams, and Ted Ryerson. This report was originally proposed by Dr. Harold Van Cott and Dr. Joel Kramer, who also contributed.



## CONTENTS

INTRODUCTION . . . . .	3
PURPOSE . . . . .	3
SEARCH CATEGORIES . . . . .	4
MANUAL VERSUS MACHINE SEARCH . . . . .	5
MANUAL SEARCHING PROCEDURES . . . . .	6
Indexes . . . . .	7
Bibliographies . . . . .	9
Abstracts . . . . .	10
Reviews . . . . .	11
INDEXING, ABSTRACTING, AND DISTRIBUTION OF SPECIALIZED SCIENTIFIC LITERATURE . . . . .	11
Research Centers . . . . .	15
COMPUTER SEARCHING PROCEDURES . . . . .	15
Unique Computer-Readable Data Bases . . . . .	19
Miscellaneous Issues and Developments . . . . .	21
APPENDIXES	
A. Journals that Carry Human Factors Information . . . . .	23
B. Human Factors Booklist . . . . .	27
C. Bibliographies of Human Factors Publications . . . . .	33
D. Depository Libraries for U. S. Patents . . . . .	35
E. Data Bases Relevant to Human Factors . . . . .	37

## GUIDE TO HUMAN FACTORS INFORMATION SOURCES

### INTRODUCTION

Organized retrieval of human factors material follows the same basic principles and broad procedures as retrieval of any scientific information with certain differences of detail. Within typical information-indexing sources, human factors are not generally recognized as an integrated field. Accordingly, a search for human factors related publications is not started with a single, identifying category but rather with a variety of possible labels and designations like human factors, human engineering, human performance, ergonomics, behavioral science, engineering anthropometry, engineering psychology, industrial psychology, organizational psychology, occupational psychology, experimental psychology, biomechanics, biotechnology, industrial engineering, operations research, operations engineering, man-machine systems, information sciences, and safety. Furthermore, each subject category can involve one or more of several contributing disciplines including anatomy, physiology, psychology, anthropology, physics, and statistics. This diversity of sources can present a special challenge to anyone who is looking for direction in locating specific information. The mission-oriented human factors researcher who needs the integrated view must frequently survey sources in as many directions as there may be investigators of particular backgrounds or objectives.

Fortunately, many important articles in human factors, as in any science, are published in a relatively small number of professional journals. This makes the search process, at least for journal articles, less difficult than it would be otherwise. Nevertheless, a broad approach is generally recommended because it can reveal interesting material in unsuspected sources, suggesting refinements or variations in the study topic and extending the search into different areas. It is reputed that within published original research, roughly one-third of the articles on a given subject appear in those communications that are dedicated to that subject, another third are found in publications on related subjects, and the rest show up in obscure places.

Appendix A provides a list of the most frequently referenced journals that carry human factors information.

### PURPOSE

The purpose of this guide is to provide a descriptive guide to the principal sources of human factors information.

## SEARCH CATEGORIES

In charting a search, it is helpful to designate the various (1) kinds of information pursued, (2) types of publications produced, (3) classes of currentness of the information searched, (4) styles of search procedures, (5) forms of search procedures, (6) orientations of stored-information files (data bases), (7) options for computer services, and (8) categories of search users.

1. Kinds of information for which one might search are (a) data, for example, anthropometric measures or daily temperature recordings; (b) bibliographic references: author's name, author's affiliation (referred to as the corporate author), subject title and subtitles, date of release, name of publication, volume, page, and issue, number of pages in the article, and the name and address of the publisher; (c) content material: reviews, abstracts, or full texts of published items, including pertinent results and validity estimates; (d) names of organizations conducting work in a field of interest with descriptions of their work; and (e) guidance to sources capable of providing relevant information.

2. Types of publications containing human factors information that may be used are books, monographs, professional organizations' refereed journals, trade magazines, miscellaneous periodicals, irregularly issued reports, conference proceedings, dissertations, and patents. Reports may be in the form of expository presentations or data collections (or both). Books and major periodicals are routinely abstracted and indexed in standard references. Most of the remaining publications must be searched for through special channels.

3. Currentness of information searched for may be (a) historical, more than a decade old; (b) modern, 2 to 10 years old; (c) recent, under 2 years old; (d) current, just released; and (e) ongoing, proposed, in progress, in review, or in press, but not yet formally published. Searches of existing publications other than current issues are called retrospective; searches of current issues and of ongoing activities are termed current awareness.

4. Search styles are (a) manual, with card catalogs, photocopy listings, or microfiche records, together with hard copy reference sources ordinarily in a library setting; (b) machine operation, at a computer terminal from electronically stored data bases with special intervening communication systems, usually supported by an intermediary retrieval specialist; and (c) interactive combinations of manual and machine procedures.

5. Forms of search procedures, either manual or machine, may be (a) custom, designed to respond to a specific inquiry; (b) current interest, periodic and routine compilations of new, arbitrarily selected works in several major fields; (c) selective dissemination of information (SDI), periodic updates with articles that are specifically selected to match a subscriber's particular interest profile; and (d) private library, in which information extracted from miscellaneous sources is retained in files that are the exclusive domain of an individual user.

6. Orientations of data bases are (a) discipline directed, devoted to a specific field of study such as psychology or biology; (b) mission directed, devoted to a specific overall application area such as space or defense; (c) problem directed, devoted to a specific concern such as claustrophobia or reflex action; and (d) multifaceted, with materials from many fields and interests.

7. Options for computer services are (a) batch, in which requested information is processed in bulk and normally, in the interest of economy, forwarded to the recipient by mail either overnight or within a few days; and (b) on-line, in which the character and extent of the search are controlled interactively during the course of the search to ensure that the information provided conforms to the user's needs.

8. Searchers may be (a) novices in the particular area of the search with little or no background in the subject area pursued; (b) generalists in the field, seeking detailed information on a specific subject or aspect; or (c) knowledgeable experts in the field, seeking information on new and as yet undisclosed efforts, or seeking reports from sources that may have escaped prior notice.

#### MANUAL VERSUS MACHINE SEARCH

Hand and machine searches proceed in fundamentally the same manner so that proficiency in one type of search extends to the other. However, since significant differences in practical operation generally favor the machine method, there is a substantial and growing tendency toward computer usage. Manual searching is a fairly tedious and time-consuming undertaking that can occupy hours or days, particularly in interdisciplinary searches that characterize human factors work. Machine searching, on the other hand, takes a matter of minutes regardless of the complexity of the subject matter, allowing exploration into peripheral fields with little extra time and effort. Hand searching demands the user's personal confinement to a library and the manipulation of heavy, oversized reference volumes; machine searching requires only a portable typewriter terminal that can be located anywhere, including a corporate office, a research laboratory, or even a private residence. Furthermore, machine operation is readily accessible to ingenious and highly effective search strategies that are difficult, if not impossible, to achieve in hand searches.

Before presuming that computer retrieval will imminently eliminate the need for most manual functioning, it should be noted that from the extensive, total volume of the world's published literature, only a selective and relatively small part--but an important part--is organized for computer accessibility. Computerized data bases are typically confined by memory limitations and considerations of economy to records of about the last 10 or 15 years and they do not contain information predating that period. Also, searches for specialized sources with only a few citations can often be conducted more effectively by hand than by computer.

Information generation and information demands are constantly pressing the technologically advancing limits of both communications links and computer facilities. Busy signals are not uncommon on information-processing communications circuits today and minor but increasingly frequent computer delays occur during popular usage periods. Although most estimates show the total cost of searching, including that of personnel time, to be less with a computer than with hand operations, computer retrieval carries a significant direct charge (\$35 or more on-line and \$100 or more off-line). Presently, machine searching facilities are unavailable to some researchers and some still prefer to use manual procedures because they are familiar with conventional print sources. The existing lack of standardization among data base vocabularies and among information-system command languages inevitably confuses the terminal operator and requires the development of specialized skills that deter direct use by the interested person. Finally, unless a precisely formulated retrieval inquiry has been developed, manual preselection from the overall literature is often requisite to efficient machine retrieval.

A particular concern with machine searches conducted from an isolated terminal is that the output is often just a print-out of bibliographic references or, at most, some abstracts, but not the full texts of the desired materials. Consequently, at the conclusion of the computer search, the materials that have been identified must be located. The manual searcher faces the same problem but possibly to a lesser extent. The manual search is usually performed within a library and the hard copy materials are easily obtainable; at least part of the time, the full referenced writings are also readily available.

#### MANUAL SEARCHING PROCEDURES

Because of continued advances in nutrition and exercise, body dimensions and body performance have altered in recent periods so that data from many pioneering human factors studies are now obsolete. Nevertheless, there are many early notable reports, including studies on reaction time conducted at the turn of the century, that are still valid today. To pursue reports of recent work, manual or machine retrieval may be used. For the early studies, a manual search must be used because finite limits on practical information storage exclude historical items from most computerized data bases.

The sequence of steps in a manual search proceeds most effectively from the perusal of broad overview treatments to concentration on narrowly specialized presentations. In general, only the initial approach in the sequence, which is relative to the scope of the starting materials, differs according to the background of the searcher. The expert, with knowledge of important authors, dates, and publication media, can go directly to certain known reports and proceed from there through interlocking reference citations. The novice, on the other hand, must start with textbooks or even standard encyclopedias, considering, however, that most texts are about 2 or 3 years behind the publication dates of the latest works they cite; encyclopedias are further behind; and even original articles in pro-

professional journals lag the completion of the research they describe by at least a year. A compilation of recognized books in human factors and related fields is presented in Appendix B.

The aim of a preliminary review is to uncover leads that will focus the search toward the desired information. Accordingly, in the initial stages, the searcher should record clues that will aid in the inquiry: authors whose names appear with regularity; the media that each author seems to favor; relevant subject headings, terms and phrases; key words that define and delimit the topics; synonyms to key words; and possible foreign variations in terminology.

## Indexes

After a few entry points to the literature have been established by way of authors' names, well-defined subject headings, and other descriptors, the principal search effort begins. The major facilities for manual search are indexes, bibliographies, abstracts, and reviews. Indexes (aside from those that are within books or documents and applicable only to those respective books or documents) are sources that are devoted principally or exclusively to tabulations of publication titles for guidance in searching general literature. Separate indexes are routinely published for tabulations of books, periodicals, and individual articles or reports.

A popular index of English-language books in all fields is provided by the annual issues of Books in Print, with entries arranged by title, subject, and author. Among the indexes of particular interest for human factors work and available in most major libraries are the monthly Engineering Index, published by Engineering Index, New York; the monthly Index Medicus, prepared by the National Library of Medicine, Bethesda, MD, published by the U.S. Government Printing Office; and the quarterly Science Citation Index of the Institute for Scientific Information (ISI), Philadelphia.

Each individual information system or data base may have its own indexing idiosyncracies. The medical reference, Index Medicus, publishes its alphabetical vocabulary and special indexing procedures in its annual January issue. An article on dizziness cannot be found in Index Medicus under the subject heading "dizziness." Instead, the user must try an appropriate synonym--"vertigo." An article on cutaneous tuberculosis is not found under "cutaneous tuberculosis" but under "tuberculosis, cutaneous." On the other hand, vinyl ether is found under "vinyl ether," not under "ether, vinyl." These samples indicate some of the typical problems of pursuing references through standard indexes. The searcher must often exercise ingenuity and persistence.

Indexing of engineering journals generally follows the Thesaurus of Engineering and Scientific Terms, published by the Engineers Joint Council, New York, 1967. The Thesaurus of Psychological Index Terms, developed by the American Psychological Association, charts concepts in two ways: the first, in relation to various other concepts, and the second, in relation

to various processes. A helpful guide to general social sciences terminology is Benjamin B. Wolman's Dictionary of Behavioral Science, published by Van Nostrand Reinhold, New York, 1979.

The use of controlled terminology and the requirement for a thesaurus are avoided in those sources that employ unconventional or permuted indexing--key word in context (KWIC), key word out of context (KWOC), or variations--such as the indexes used in Biological Abstracts or in the Science Citation Index.

While conventional indexing uses concepts taken ordinarily from a title and presumably descriptive of the content of an article, KWIC (key word in context) and similar indexes emphasize key words that may be taken from any part of the article, especially if the title is not clearly indicative of the subject matter.

In the KWIC index, key words are located in the center column of the page and they are presented in the context of the sentence in which they appear in the title or in the body of the referenced article. At the extreme right of the row is a code number which identifies the full citation within a numerically sequenced list given elsewhere. At the discretion of the editors, the same title might be also indexed under any or all of those words in the title. A slash (/) is a separator designating the beginning of a quoted excerpt. Any continuation from the right extremity is picked up at the left extremity in the same row.

The KWIC pattern is referred to as "permuted" because the quoted excerpts are rearranged (permuted) in the indexing format. The folding-back rearrangement is desirable to allow the presentation of an informative, extended phrase within the confines of a printed page.

Generally, each KWIC-type index has its own stoplist of words that is considered unnecessary or meaningless for indexing. Excluded words are those that occur with high frequency such as grammatical articles and prepositions. In a list of documents that are all on human factors, the words "human" and "factors" would probably also be excluded because these words would not help to identify any particular document within the given group. Stoplist words vary from index to index and even from time to time for a particular indexing system. Within a specific index, some titles may appear many times, and other titles may appear only a few times (conceivably never), depending upon how that particular system chooses to select stop words. Overall, the KWIC index is a useful tool for manual searches. The KWOC (key word out of context) approach is similar except that the key word is printed in boldface type within the quoted excerpt and it is placed "out of context" at the extreme left of the row for easy spotting.

The Science Citation Index, with its associated volumes (the Citation Index, the Source Index, and the Permuterm Subject Index) offers several useful indexing formats, including natural-language title excerpts for the same published articles with multidisciplinary and cross-disciplinary coverage. The Citation Index lists (a) authors who in their writings cite other authors and their articles, and (b) authors and articles that are cited by other authors. This presentation identifies all published items that cite a specific earlier work and it provides a ready means of retrieval.

ing later publications, up to and including current ones, on re subjects.

Other helpful ISI publications are (1) the weekly Current Contents unit B on Social and Behavioral Sciences, unit E on Engineering Techn and Applied Sciences, and unit L on Life Sciences, which collect furnish up-to-date tables of contents to literature in all fields rel to human factors, and (2) the monthly Index to Scientific and Tech Proceedings and Books, which provides information on individual p presented in conferences held throughout the world. Both Current Con and the Index to Scientific and Technical Proceedings and Books periodic ly provide cumulative records to support retrospective searching. aid to readers in requesting reprints of articles, every issue of Cu Contents contains an author-address directory that provides the com address of the senior author of each article.

### Bibliographies

A type of literature guide that is similar to the index is bibliography. This is a list of writings and their publication sou sometimes with brief annotations but usually without the cross-refere that characterizes the index. One way to locate bibliographies and reference sources in a particular area of human factors is th guidebooks like those listed below:

An Annotated Bibliography of Bibliographies Pertinent to the D and Use of Machines by Human Operators, Patricia S. Allen and Ez Saul, Tufts University in Human Factors 1, 26, 1958, publish Pergamon Press, New York;

A Guide to the World's Abstracting and Indexing Services in Sc and Technology, prepared by the Science and Technology Division, Library of Congress, published by the U.S. Government Printing Of Washington, D.C., 1963. Includes 1,855 indexing services origin in 40 countries;

World Bibliography of Bibliographies, 5 vols., 4th ed., compil Theodore Besterman, published by Rowman Tree Press, Ltd., Boston 1963. This classical, multidisciplinary work includes an ind review literature;

The Directory of Scientific Directories: A World Guide to Scien Directories Including Medicine, Agriculture, Engineer Manufacturing, & Industrial Directories, 3rd ed., edited Burkett, published by Gale Research Company, 1979. An internat listing of bibliographies, indexes, and directories in all scier libraries. Covers a wide range of scientific, industrial, and facturing directories, all arranged geographically by continent country.



Guide to Reference Books, compiled by Eugene P. Sheehy, published by the American Library Association, Chicago, 1976. Covers general works, bibliographies, and encyclopedias in the humanities, social sciences, history and area studies, and pure and applied sciences through mid-1974.

Although indexes are generally updated regularly, a bibliography is apt to be a one-time issue. An exception is the annual International Bibliography of Social and Cultural Anthropology, prepared by the International Committee for Social Sciences Information & Documentation, published by International Publications Service, New York. A companion to other UNESCO (the United Nations Educational Scientific and Cultural Organization) annual bibliographies in the social sciences, it lists books, periodicals, articles, and duplicated materials from many countries.

Some excellent specialized bibliographies are presented, not as independent bibliographies, but as appendixes to other publications. For example, the book by Albert D. Lemon, Howard W. Stoudt, and Ross A. McFarland, The Human Body in Equipment Design (Harvard University Press, Cambridge, MA, 1966) contains an appended bibliography of approximately 400 references relating to applied physical anthropology.

Appendix C lists independent bibliographies that pertain exclusively to human factors literature.

#### Abstracts

An abstract provides a brief summary of a publication in condensed or digest form. It is intended to convey the subject of the cited work, postulates involved, the procedures employed, and the conclusions deduced. An abstract provides readers with an indication of the article's value, allowing them to decide whether to investigate the original material. Abstracts of journal articles generally appear within 6 months of the corresponding original publications.

This is a list of periodically published abstracts pertinent to human factors work:

Biological Abstracts (Biosciences Information Service of Biological Abstracts Inc., Philadelphia), bimonthly;

Chemical Abstracts (American Chemical Society, Columbus, OH), monthly;

Ergonomics Abstracts (Taylor and Francis Ltd., London), quarterly;

Psychological Abstracts (American Psychological Association, Washington, D.C.), monthly; and

Science Abstracts (Institute of Electrical Engineers, London), semimonthly.

## Reviews

A review is a summary and evaluation of a previously published writing. In contrast to the abstract, which is generally a brief digest prepared by a technician, the review is customarily a fairly extensive discussion prepared by a recognized authority, and it is an ideal guide for those with serious interest in a specific field. In many instances, the review can provide all the information required and can eliminate the need for further searching.

Reviews are of two kinds. One type summarizes and evaluates the presentation of an individual article or book. Reviews of this type appear intermittently in Human Factors and in many other professional journals. The second type of review surveys the work of many researchers and highlights the total developments in a field over a period of time. Such reviews are regularly found in journals whose titles include descriptions like "advances in," "annals of," "progress in," "review," and "yearbook."

Identifying reviews or abstracts of reviews in conventional indexing and abstracting sources is not easy to do because bibliographers ordinarily do not designate reviews as such. In recognition of the importance of reviews for guiding research, the editors of Chemical Abstracts, since 1967, have assigned the symbol "R" to reviews. The Science Citation Index also uses an R-code to identify review articles. Nevertheless, for many years, reviews on specialized subjects remained difficult to identify.

The Institute for Scientific Information (ISI) publishes the Index to Scientific Reviews, which annually indexes the review literature in about 3000 journals and 350 books. This helpful source, which is available in most technical scientific libraries, follows the ISI practice of listing references independently by author, subject, author's affiliation, and permutations of significant title words. The historical coverage of the Index, back to 1974, is adequate for most literature searching in human factors since textbooks normally provide expert assimilations of earlier developments and, hence, minimize the need for specifically designated "reviews" of the early periods.

## INDEXING, ABSTRACTING, AND DISTRIBUTION OF SPECIALIZED SCIENTIFIC LITERATURE

One of the world's largest distributors of scientific documents, with over one million titles in stock, is the National Technical Information Service (NTIS), U.S. Department of Commerce, located in Springfield, VA 22161. NTIS is the central clearinghouse for research, development, and engineering reports prepared by and for agencies of the federal government. Some of the more productive agencies that process human factors information through NTIS are the Department of Defense, the Department of Energy, the Department of Transportation, the National Aeronautics and Space Administration, the Federal Aviation Administration, the Department of Health and Human Services (formerly the Department of Health, Education, and Welfare), the Department of Housing and Urban Development, the Environmental Protection Agency, and the National Institute for Occupational Safety and Health.

Most scientific libraries receive the biweekly journal, the Government Reports Announcements and Index, which undertakes all-inclusive abstracting and indexing of NTIS reports. A special annual, cumulative index is organized by six categories: subject, author, corporate author, contract number, report number, and accession number.

NTIS also publishes abstract newsletters in each of 26 specialized areas, providing timely research summaries within 3 weeks of receipt of the original reports. Cumulative monthly indexes provide report titles and corresponding newsletter page numbers.

The NTIS brochure, PB-270 575, NTIS Subject Classification (Past & Present), organizes all of its reports into 39 major subject categories which are further divided into 325 subcategories. Category 95D, entitled "Human Factors Engineering," covers the following subjects: design of tools, instruments, equipment, and machinery with emphasis on optimum use by humans; habitability of work and living space; ergonomics interaction of people and equipment in terms of subsystems and system performance requirements and evaluation. The material encompasses manual controls, tactical kinesthesia, and other human sensory modalities involved in the operation of equipment and understanding of personnel subsystems, including anthropometric studies, protective equipment, protective clothing, and life-support systems.

An annual index contains up to 10 cross-references for each indexed research summary. One of the series of 26 abstract newsletter areas is entitled, "Biomedical Technology and Human Factors Engineering." The annual newsletter subscription rate ranges from \$60-\$205. A general catalog of NTIS services and major categories of titles is provided in the booklet, NTIS General Catalog of Information Services No. 8a (1983).

Like other federal government agencies, NTIS accepts checks or money orders in payment for document orders. However, NTIS also accepts NTIS deposit accounts, VISA, MasterCard, and American Express credit cards for over-the-counter, mail, or telephone orders. The order-unit telephone number is (703) 487-4650.

In the past, the Office of Personnel Management has attempted to encourage all federal government agencies to publish their scientific reports exclusively through NTIS. Nevertheless, each agency that generates information is free to publish its own reports directly and independently and many do so at least in part. The result is that a manual search for government reports can be considered comprehensive only if it searches the files, not simply of NTIS, but of each other pertinent federal agency as well. This problem does not ordinarily arise in computer searching that is conducted through any of the large commercial information distributors because they retain complete data bases from almost every government outlet.

Some overlap of general publishing functions exists between NTIS and the Government Printing Office (GPO), both of which publish government materials exclusively. NTIS is under the executive branch; GPO is under the legislative branch. NTIS handles only scientific and technical reports; GPO handles some scientific and technical reports for agencies that have requested so.

There is not a sharp separation of publication jurisdiction. Much of GPO's output, aside from Index Medicus, is of only peripheral or negligible interest to human factors researchers. NTIS' reports are always available; GPO's publications are only available while the printed supply lasts.

A document that describes the content of GPO reports, Government Periodicals and Subscription Services, is available on request from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402. The GPO's complete catalog, Subject Bibliographies and Index, is available in major libraries.

A particularly helpful service for human factors analysts is provided by the National Institute for Occupational Safety and Health (NIOSH). The address is 4676 Columbia Parkway, Cincinnati, OH 45226, telephone number (513) 684-8317. NIOSH has established a clearinghouse for occupational safety and health information which provides full information retrieval of its materials through key word search. A limited number of NIOSH reports are distributed through both NTIS and GPO.

The Smithsonian Science Information Exchange ceased operation in October 1981. NTIS has assumed responsibility for providing abstracts of research in progress, principally within the United States, through the Smithsonian Science Information Exchange (SSIE) data base. The SSIE data base includes records describing about 300,000 current research projects funded by federal agencies. About 100,000 records are added annually. (Of these, about one-third describe new research and about two-thirds describe continuing projects).

The American Psychological Association supplements its standard digest offerings in Psychological Abstracts through a subsidiary unit, the Journal Supplement Abstract Service (JSAS). JSAS prints materials which, for some reason, are unsuitable for publication in regular professional journals. Such materials might include massive data collections (too large for routine journal publication), reports of well-designed studies with negative results (invaluable to some investigators but of little use in general), and presentations of interim progress in lengthy studies (where the final report, suitable for conventional publication, may not be completed for some time). The contents of all manuscripts accepted by JSAS are presented in the form of author-prepared abstracts by the biannual journal, Psychological Documents. However, full-text copies of documents are issued individually only on demand or as annual collections on microfiche by subscription. A cumulative index of volumes 1-6, 1971-1976, subdivided by subject, author, and manuscript number, may be purchased from the American Psychological Association, 1200 Seventeenth Street, N.W., Washington, D.C. 20036. Separately published indexes for later years may also be obtained.

United States patents may be found either at the U.S. Patent and Trademark Office, 2021 Jefferson Davis Highway, Arlington, VA 22202 or in one of the specifically designated depository libraries located in major centers throughout the country. The libraries and their locations are identified in Appendix D. Each library should have a copy of the Manual of Classification of Patents with its accompanying Alphabetical Index of Subject Matter and a collection of more than four million existing patents

either in hard copy or in microform. The Manual organizes science and technology into 300 main classes with each main class divided into more than 90,000 subclasses of related subjects (with some patents referenced in more than one class). After determining specific subclasses of interest, copies of individual patents may be selected for inspection directly within the depository library or a list of consecutively numbered patents for retention can be bought from the Patent Office. If the requested patent sequence is entirely within one subclass, the price is \$1 for up to 100 patents; if the list extends beyond 100 patents, there is an additional charge for each extra hundred. The ordering address is 2021 Jefferson Davis Highway, Arlington, VA 22202.

Abstracts of university dissertations can be found in American Doctoral Dissertations and in Dissertation Abstracts International, both of which are published by University Microfilms International, Ann Arbor, MI 48106.

Security-limited reports, abstracts, and indexes are processed by the Defense Technical Information Center (DTIC), located at Cameron Station, Alexandria, VA 22314. DTIC publications are available with appropriate clearance to agencies undertaking work sponsored by the federal government and to certain other organizations that may be declared eligible by a military service. Information regarding DTIC operations, including registration procedure, is available in a manual entitled, "Certification and Registration for Access to Department of Defense Scientific and Technical Information" (DLAM4185.16).

The classical abstract of general numerical data is the annual Statistical Abstract of the United States, which can be purchased from the U.S. Government Printing Office. The Abstract attempts to select from the best available published statistical data, but it does not, by itself, assume responsibility for the reliability of the data. However, it properly credits the original sources of the information and these original sources should be consulted for indications of statistical validity.

Researchers may occasionally seek materials prepared by the federal government that are not published in the open literature. Such searches are now facilitated by the Freedom of Information Act, Section 571, of Title 5, U.S. Code, 4 July 1967. This act declares that 1) any person should have clear access to identifiable agency records without having to state a reason for wanting the information and 2) the burden of proving that withholding is necessary is placed on the federal agency involved. Exceptions for proprietary and security-classified information are among the limited number of reasonable exclusions to the provisions. However, any written material that is not otherwise exempt must be considered admissible for public disclosure and must be made available to the requester. (The Government Printing Office publishes A Citizen's Guide on How to Use the Freedom of Information Act and the Privacy Act in Requesting Government Documents, order number S/N 052-071-00540-4. The price is \$2 per copy.)

## Research Centers

A good general procedure for obtaining information in a specific field is to contact active workers in that field. On request, the Library of Congress National Referral Center offers referral service free of charge to anyone in the physical, biological, social, or engineering sciences. The Center will provide names, addresses, telephone numbers, and any special stipulations of information services with the objective of helping establish direct contact between persons seeking specific information and all those having such information. At present, more than 60 organizations worldwide are registered as being involved in human factors engineering research. Inquiries for referrals should be addressed to the Library of Congress, National Referral Center, Washington, D.C. 20540.

Another guide to research activity centers is the Research Centers Directory, 1983, (8th ed), published by the Gale Research Company, Detroit, MI. The Directory lists 20 centers engaged in human factors studies, citing name, address, and telephone number of each organization; the name of the head official; a description of the institution; designation of its principal fields of research; and an indication of its research publications. A companion volume published by Gale, the Encyclopedia of Associations, provides detailed information on the activities of all professional organizations, including the Human Factors Society, the International Ergonomics Association, and the Methods Time Measurement (MTM) Association for Standards and Research.

## COMPUTER SEARCHING PROCEDURES

The sources tapped for computer search are the electrical counterparts of the many printed data bases prepared by government agencies, some private firms, and by professional and academic organizations. Some of the major, machine-readable data bases may be directly scanned by users from a remote terminal; for most of these data bases, searches may be ordered from the respective agencies over the counter, by mail, or by telephone. However, a common practice of searchers is to take advantage of the convenient information supermarkets that exist in the form of commercial vendors, who buy or lease 50 to 100 different data bases from their origins, repackage the contents according to their own formats, and then offer the collective data sources to users through aggregate systems.

The services available from commercial vendors include (1) comprehensive reference searches, both retrospective and current awareness, (2) current awareness updates, (3) standard topical searches, (4) standard topical updates, (5) SDI, custom reference searches, (6) SDI updates, (7) special organization and characterization of results from any search, for example, sequential data arrangements, counts and markings of selected properties, (8) private library accommodations (customers are given a reserved file for their exclusive use), and (9) document acquisition.

The actual process of computer searching from a terminal is ordinarily effected through an intermediary information specialist. Unfortunately, communication with machine-retrieval systems demands continuously updated knowledge in several areas: terminal operation, search strategies, enabling

protocols of the major information vendors, and the unique features of many different data bases, including content, format, vocabulary, and indexing. Many researchers have neither the time nor the inclination to master the miscellaneous requirements; they settle for a brief familiarity with the broad aspects of machine retrieval and they assign the formal search details to a trained specialist. When standardization, or at least accommodation, improves, researchers might then elect to conduct their own searches independently.

The vendor can be contacted directly by the person requesting a search (or, more usually, by the person's delegated information specialist), or an outside broker can be hired to execute the search interaction with the vendor. Brokers are professional searchers who, from their own office terminals, independently pursue retrievals from various vendors' files.

The principal requirement in the search process conducted through an intermediary information specialist is the development of clear-cut information needs. Without a definite sense of direction, an information search will be futile. Computer intermediaries, however, who are probably searching in a field outside of their special expertise, must be given explicit guidelines. After the information needs are articulated to the intermediary, a computer search is sometimes unnecessary.

A lucid way of presenting a search objective is either by Boolean (and/or) expressions or by Venn diagrams. (For an explanation of the use of Venn diagrams specifically in the search process, refer to "Venn Diagramming for On-Line Searching," by Sallie Wrye Smith, in Special Libraries for November 1976, pp. 510-517.)

The depiction of the user's wanted and unwanted materials is referred to as the user's "profile." It is imperative to specify unwanted as well as wanted information because, otherwise, the computer response could inundate the requester with miscellaneous data that might render the search ineffectual.

Searches through individual data bases can be purchased. However, there is usually an advantage in using a distributor because, in a single transaction, a search can be made through all of the relevant data bases in the distributor's inventory, creating a more enhanced opportunity for locating appropriate citations. Nevertheless, there is one data base --actually a collection of data bases-- that should be considered as a possible independent source of literature citations for much human factors work. MEDLARS, the computerized bibliographic retrieval system of the National Library of Medicine, has 4,500,000 references to journal articles and books published after 1965. MEDLARS is available in the United States through a nationwide network of centers at 1,900 universities, medical schools, hospitals, government agencies, and commercial organizations. It is also available in 11 foreign countries. Information on MEDLARS may be obtained from the National Library of Medicine, MEDLARS Management Section, 8600 Rockville Pike, Bethesda, MD 20209, telephone number (301) 496-6193 or (800) 638-8480.

The major active information distributors in the United States are the Lockheed Information Systems, Palo Alto, CA 94304, which operates DIALOG; the System Development Corporation (SDC), Santa Monica, CA 90406, which operates ORBIT; and Bibliographic Retrieval Services, Latham, NY 12110,

which operates BRS. Each of these vendors retains a sufficient number of different data bases to ensure an intensive search in almost any scientific area. Lockheed currently has the largest number of data bases, more than 175, with approximately 80 million records. SDC has more than 70, and BRS exclusively has the MEDLARS/MEDLINE system. NIOSHTIC is NIOSH's (National Institute for Occupational Safety and Health) on-line bibliographic data base for literature retrieval in the field of occupational safety and health. The commercial vendors do not require initiation fees and they charge only nominal amounts for instruction courses and supplementary materials.

Search contact with any of the vendors may be made through the use of the dedicated data communication networks, Tymnet and Telenet, operated respectively by Tymnet, Inc. and by the GTE Telenet Corporation. A customer may also connect to vendors directly over regular telephone circuits, telex, or TWX. However, the specialized communication networks, in coordination with the information vendors, have been able to provide low connect-time charges through (1) customers jointly sharing the communication channels at volume rates and (2) the introduction of technological advances that provide for fast message transmissions and, hence, for low time charges per individual message. Tymnet and Telenet have local outlets all over the United States and a user simply dials the nearest appropriate local outlet, which in turn completes the connection to a computer.

Although information retrievals of a decade ago were largely of the batch type, the trend has been to use almost exclusively on-line, interactive search procedures, reserving batch operations mainly for the off-line preparation and printing of lengthy records. The advantage of the on-line search, rather than the batch arrangement, is the extreme flexibility of on-line searching which compensates for its higher connect-time rate. For example, if the computer response to a query indicates that 500 titles are available in a particular cluster, the searcher--instead of requesting a display of all 500 titles--can choose to sample a few of them to decide if the cluster is truly responsive to the end objective. In addition, searchers can efficiently refine the request in stages, permitting them to focus in steps on precisely the desired result in accordance with the findings of successive returns. On the other hand, if a batch search fails to yield all the needed information on the initial try, it is essential to start all over again from the beginning. This process might need to be repeated a few times (at both dollar and frustration cost) before an acceptable result is obtained.

One exception to the use of on-line searching is the economy-oriented, New England Research Application Center (NERAC) at the University of Connecticut, Storrs 06268. NERAC specializes in efficient batch processing from 52 data bases (supplemented by graduate student manual searching if necessary) with fast turnaround times and full document recovery, primarily for subscription customers who may use 25 or 30 searches per year. NERAC's data bases include several related to human factors.



The principal concerns confronting the user at the onset of a search are determination of which information service to select and, within that service, which data bases to query. The solution of the first concern--selection of a system--may depend upon the types and extents of information stocked by the system, the convenience of the related search protocol, the associated charges, and any unique features which may be described in the brochure that each service provides.

The solution of the second concern--selection of a data base or of data bases--is of particular interest to human factors analysts who, because of their cross-disciplinary interests, may routinely require a variety of information sources. This could demand the utilization of a number of different data bases in a search, a practice which is sometimes resisted because the searcher may have become attached to one or two favorites and may be reluctant to try others. Also, involvements of a large number of data bases can imply relatively large costs. Furthermore, there is a concern that searching through many different data bases could be wasteful because of possible citation overlap. However, studies on redundant coverage generally confirm that citation overlap is not as serious a problem as is failure to catch initial citations through the use of a too-limited data base access.

Data base selection is facilitated by certain special guides: (a) the on-line data base index, DATABASE, of SDC's ORBIT, (b) the DIALINDEX collections from Lockheed, (c) the on-line BRS cross-database search capability, BRS/CROSS, and (d) the compendium of data bases, Computer-Readable Data Bases, Directory and Data Sourcebook, 1982, compiled by Martha E. Williams, Laurence Lannom, Rosemary O'Donnell, and Stephen W. Barth of the Information Retrieval Research Laboratories of the University of Illinois, Urbana 61801. Computer-Readable Data Bases contains information on 301 major data bases--more than 176 in the United States--with a detailed description about each. Computer-Readable Data Bases is published by the American Society for Information Science, Washington, D.C. 20036, and it is for sale by Knowledge Industry Publications, Inc., 701 Westchester Avenue, White Plains, NY 10604. It is a stock item in many science libraries.

A more comprehensive, but less detailed guidebook, the Encyclopedia of Information Systems and Services, 1982, Gale Research Company, Detroit, MI 48226, provides information on each of 2,500 computer-readable data bases.

Appendix E gives a list of computerized data bases containing information related to human factors.

As a follow-up to the search for specific titles and abstracts, recovering certain full texts for detailed review and study is often required. The process of locating these items can be quite time-consuming, particularly if any of them are of foreign origin or are otherwise of limited access. NTIS supplies, on prepaid order, copies of any identified reports from its files. However, this request must be separate and distinct from on-line search operations, and, furthermore, the response in-

volves a delay of about 3 weeks. On the other hand, ISI, along with its data base, has developed a service called The Genuine Article (formerly OATS) in which the full copies of articles, from almost any significant journal worldwide, can be ordered on-line by a customer through any of the major commercial vendors and the copy is forwarded in the mail on the same day on which the order is received. ISI makes this possible by its multiple subscriptions to more than 6,800 journals from most of which it either directly tears out, or photocopies, the full text of the requested material. ISI does not supply complete journal issues, and it does not provide tear sheets for articles published in books. A copyright royalty to the publishers is included in the charge for the service. (ERIC, the computerized data base of the Department of Education, similarly to NTIS, supplies copies of its documents on request for a fee. However, most of its documents appear to be of only peripheral interest to human factors specialists.)

One component of the MEDLARS package, SERLINE (Serials Online), unlike most bibliographic data bases, lists the journals rather than the articles they contain. The "SER" is for "serials," and there is information on nearly 40,000 of them in medicine and related fields. Included are all those the National Library of Medicine receives, has on order, or is processing. Many of the records tell where the publication can be found among resource libraries in the Regional Medical Library Network. It is especially useful for tracking down publications that have changed their titles, as well as for finding out what library has an obscure journal that is needed.

#### Unique Computer-Readable Data Bases

Some independent data bases merit special note. One of these is the Subject-Content-Oriented Retriever for Processing Information On-line, popularly known as SCORPIO. SCORPIO, operated by the Automated Systems Office of the Library of Congress, provides interactive, on-line service to readers who are present within the Library, and it is one of the few systems in operation today in which all users normally interact directly with the supporting computer without an intermediary specialist. The system contains several files of legislative reports that are of primary concern to only congressional offices (for whom SCORPIO was originally designed), but it also has records of recently published articles from some 2,000 periodicals, a directory of information resources in the United States, and a listing of over one million book titles from the Library's main catalog, much of which is pertinent to human factors interests. In addition to offering the direct, on-line service for individuals within the Library, SCORPIO also provides batch service in response to mail inquiries requesting the location of information sources. Both internal and external services are free (tax-supported); however, they are necessarily limited in extent and availability by the queue of users and by constraints on Library staff time. SCORPIO does not presently offer a subscriber service through remote terminals.

A second unique data base, and one that is of particular interest to human factors researchers, is the Government-Industry Data Exchange Program (GIDEP). GIDEP is an engineering services cooperative enterprise in which

each subscriber organization (there are currently about 700, including government agencies, industrial organizations, and independent laboratories) generates reports for the computer files and each subscriber retains on its premises the entire collection of accumulated reports on microfilm. A request to the GIDEP management center for a specific bit of contained data is answered with reel designation and frame number that locate the desired information directly within the records that are retained on the user's own premises. Organizations affiliated with GIDEP do not need government contracts and they are required only to provide pertinent test results to the system on unclassified and nonproprietary projects that they conduct. The costs of data processing and of program administration are covered by the Defense Department as justified by (1) the ready availability of essential data to Defense agencies and (2) the avoidance of expensive, military modifications that might be incurred without these data. The only costs to a subscriber are for the purchase of a computer terminal and microfilm reader and for the execution and reporting of specified tests. For researchers who are not directly affiliated with GIDEP, the system contents, although without the conveniences of the associated private library facilities, are readily available through the files of NTIS.

Since its inception more than 25 years ago, GIDEP has contained exclusively abstract, impersonal engineering information. However, with a recent rash of breakdowns and costly modifications resulting from operator inadequacies in technologically advanced machines, the human factors input has become increasingly recognized as a critical element in modern engineering design. The general importance of the physical-biological interface in sophisticated systems was dramatically demonstrated by the Three-Mile-Island scare, where a principal cause of the failure was ultimately revealed to have been insufficient attention to the human role in the original design concept. GIDEP contains an extensive collection of human factors reports that will establish this effort as one of the largest, independent sources of machine-retrievable human factors data in the world. Insertions into the GIDEP system are selected from approximately one hundred thousand reports of human factors studies that have been undertaken by the combined military services and their contractors over the past several years. These studies contain basic information on human skills, training implications, behavioral reactions, performance limitations, anthropometric constraints, and other biomedical factors, including concerns for the special requirements of women. The modification of the GIDEP system will provide ready access of machine designers to the needs, contributions, strengths, and weaknesses of the human component in system structures, and it will permit the designation of mission accomplishment as an operating objective instead of simply equipment reliability.

Reworking of GIDEP to allow the inclusion of human factors data involved expanding the subject thesaurus, modifying the data base format to accommodate efficient on-line searching and specialized retrieval features, processing thousands of new documents, and developing revised instructional manuals to explain the enlarged system. This was a coordinated effort between the GIDEP management and the officials of the US Army Human Engineering Laboratory.

Inquiries concerning GIDEP may be addressed to the Director, GIDEP Operations Center, Corona, CA 91720, telephone number (714) 736-4677.

#### Miscellaneous Issues and Developments

Copyright implications are causing concern in information distribution. Some information services charge a fee to cover copyright royalties; others do not. The right to reproduce copyrighted material is presently subject to "fair use determination," which is the responsibility of the user. The existing copyright law, (PL 94-553) is presently intentionally vague while complex copyright issues are being resolved. "Fair use determination" is based upon

- (1) the purpose or character of use, whether for commercial use or for nonprofit, educational use;
- (2) the nature of the copyrighted work;
- (3) the amount and substantiality of the position used; and
- (4) the effect upon the projected market for, or value of, the copyrighted work.

A serious problem of data collection by computer processing is the confusion caused by incompatibilities in numerical tables whose inputs are lifted out of context from the experimental results of different workers. The computer print-out, of course, does not cause data discrepancies (aside from the usual computational errors caused by cutting and rounding off of numbers); however, it can compound inherent statistical problems or invalidities. The problems of incompatibilities in data collections relative to the establishment of an ergonomics data base are emphasized in the report of the earlier referenced study at the National Bureau of Standards, A Standard Ergonomics Reference Data System: The Concept and Its Assessment by H.P. Van Cott, J.J. Kramer, V.J. Pezoldt, L.G. Porter, and C. Fried, June 1978.

Terminals equipped with microcomputers are among the new products used for information searching. These so-called "smart" or "intelligent" terminals function on-line to the central computer only during the periods of actual communication. When not in use, the terminal operates off-line so the connect-time involvement to the main system is considerably less than it would be with a conventional terminal alone. It is conceivable that this practice, which is intended to reduce search costs, might be counterproductive if the information vendors raise their charges to compensate for their loss of revenue resulting from the terminal modifications.

If a computer terminal is inaccessible, professional on-line computer services are available by telephone, walk-in, or mail order through a broker, or so-called "retailer." About 200 information retailers are listed by state in The Directory of Fee-Based Information Services 1982, compiled by Kelly Warnken; it is for sale by Information Alternative, P.O.

Box 657, Woodstock, NY 12498 at \$12.95, prepaid. The listings include names, addresses, and telephone numbers of individual retailers, their rates (exceeding the standard retrieval charges), hours of activity, services performed, areas of specialization, and miscellaneous attributes such as fluency in languages and professional experience.

The information industry established a national organization in 1968, the Information Industry Association, which now has a membership of 170 companies engaged in information retrieval, information product manufacture, indexing and abstracting services, communication links, publication, and other services. Inquiries regarding any aspect of the information industry may be addressed to the Association at 316 Pennsylvania Avenue SE, Suite 400, Washington, D.C. 20003, telephone number (202) 544-1969.

APPENDIX A

JOURNALS THAT CARRY HUMAN FACTORS INFORMATION

## JOURNALS THAT CARRY HUMAN FACTORS INFORMATION

This is a selected list of journals that regularly carry articles relating to human factors. Because the first 12 journals listed are frequently cited in the Human Factors section of Psychological Abstracts, they are considered to be the most current, prevalent material for human factors.

Applied Ergonomics

Bulletin of the Psychometric Society

Ergonomics

Human Factors

Journal of Applied Psychology

Journal of Experimental Psychology

Journal of Motor Behavior

Journal of the Acoustical Society of America

Perception and Psychophysics

Perceptual and Motor Skills

Psychological Bulletin

Psychological Review

\* \* \* \* \*

Acta Psychologica

AIEE Transactions

American Industrial Hygiene Association Journal

American Journal of Optometry

American Journal of Psychology

Aviation Space and Environmental Medicine

Behavioral Engineering

Behavior Research Methods and Instrumentation

Biometrics

British Journal of Psychology  
Canadian Journal of Psychology (Revue Canadienne de Psychologie)  
E C & T J (Educational Communication and Technology Journal)  
Education and Psychological Research  
Gerontologist  
Highway Research Board Bulletin  
Highway Research Record  
Human Dimensions Journal  
Hungarian Psychological Bulletin  
IEEE Spectrum  
IEEE Transactions on Aerospace and Electronic Systems  
IEEE Transactions on Systems, Man and Cybernetics  
Instructional Science  
International Journal of Production Research  
International Review of Applied Psychology  
Journal of Applied Behavior Analysis  
Journal of Applied Behavioral Science  
Journal of Experimental Psychology: Human Perception and Performance  
Journal of Human Ergology  
Journal of Mathematical Psychology  
Journal of Occupational Medicine  
Journal of Occupational Psychology  
Journal of Safety Research  
Journal of the Experimental Analysis of Behavior  
Lancet  
Magyar Pszichologiai Szemle (Hungarian Psychological Review)  
Man-Environment Systems



Memory and Cognition

Navigation

Polish Psychological Bulletin

Przegląd Psychologiczny (Psychological Review)

Psychologie Francaise (French Psychology)

Psychologie V Ekonomicke Praxi (Applied Industrial Psychology)

Psychologische Beitræge (Psychological Journal)

Quarterly Journal of Experimental Psychology

Revista de Psicologia General Y Aplicada (Review of General Applied Psychology)

Studia Psychologica (Psychological Studies)

Traffic Engineering

Traffic Safety

Travail Humain (Human Factors)

Vision Research

Voprosy Psikhologii (Journal of Psychology)

Zeitschrift fuer Verkehrssicherheit (Journal of Traffic Safety)

APPENDIX B  
HUMAN FACTORS BOOKLIST

## HUMAN FACTORS BOOKLIST

This is a selected reading list of recognized books in human factors and related fields.

1. Armstrong, H. G. (Ed.). (1961). Aerospace medicine. Baltimore, MD: Williams and Wilkins.
2. Astrand, P. O., & Rodahl, K. (1977). Textbook of work physiology (2nd ed.). New York: McGraw-Hill Book Company.
3. Baker, C. H. (1962). Man and radar displays. New York: Macmillan Company.
4. Barnes, R. M. (1980). Motion & time study (7th ed.). New York: John Wiley & Sons.
5. Bartley, S. H. (1965). Fatigue: Mechanisms and management. Springfield, IL: C. C. Thomas.
6. Bartley, S. H., & Chute, E. (1947). Fatigue and impairment in man. New York: McGraw-Hill.
7. Bilodeau, E. A. (Ed.). (1966). Acquisition of skill. New York: Academic Press.
8. Booth, G. M. (1983). The design of complex information systems. New York: McGraw-Hill.
9. Boyce, P. R. (1981). Human factors in lighting. New York: MacMillan.
10. Broadbent, D. E. (1971). Decision and stress. New York: Academic Press.
11. Brown, C. C. (Ed.). (1967). Methods in psychophysiology. Baltimore: Williams & Wilkins.
12. Brown, J. H. U., Jacobs, J. E., & Stark, L. (1971). Biomedical engineering. Philadelphia: F. A. Davis.
13. Buckner, D. N., & McGrath, J. J. (Eds.). (1976). Vigilance: A symposium. Westport, CT: Greenwood.
14. Burns, N. M., Chambers, R. M., & Hendler, E. (Eds.). (1963). Unusual environments and human behavior. New York: Free Press.
15. Chapanis, A. (1975). Ethnic variables in human factors engineering. Baltimore: The Johns-Hopkins Press.

16. Chapanis, A. (1966). Man-machine engineering. Monterey, CA: Brooks/Cole Publishing Company.
17. Chapanis, A. (1959). Research techniques in human engineering. Baltimore: The Johns-Hopkins Press.
18. Colquhoun, W. P. (Ed.). (1971). Biological rhythms and human performance. New York: Academic Press.
19. Curtiss, B. (Ed.). (1981). Tutorial: Human factors in software development. Los Angeles, CA: IEEE Computer Society Press.
20. Damon, A., McFarland, R. A., & Stoudt, H. W. (1966). The human body in equipment design. Cambridge, MA: Harvard University Press.
21. Davies, D. R., & Tune, G. S. (1969). Human vigilance performance. New York: American Elsevier.
22. DeGreene, K. B. (Ed.). (1970). Systems psychology. New York: McGraw-Hill.
23. Diffrient, N., Tilley, A. R., Harman, D., & Bardagjy, J. C. (1981). Humanscale. Cambridge, MA: The MIT Press.
24. Dill, D. B. (Ed.). (1964). Adaptation to the environment. Section 4 in Handbook of physiology. Washington, DC: American Physiological Society.
25. Dreyfuss, H. (1972). Symbol source book. New York: McGraw-Hill Book Company.
26. Eastman Kodak Company, The Human Factors Section. (1983). Ergonomic design for people at work, Vol. 1. Belmont, CA: Lifetime Learning Publications.
27. Edholm, O. G., & Bacharach, A. L. (Eds.). (1966). The physiology of human survival. New York: Academic Press.
28. Fitts, P. M., & Posner, M. I. (1968). Human performance. Monterey, CA: Brooks/Cole Publishing Company.
29. Flaherty, B. E. (Ed.). (1961). Psychophysiological aspects of spaceflight. New York: Columbia University Press.
30. Frost, H. M. (1971). An introduction to biomechanics. Springfield, IL: Charles C. Thomas.
31. Gagne, R. M. (1962). Psychological principles in system development. New York: Holt, Rinehart, & Winston.

32. Geddes, L. A., & Baker, L. E. (1975). Principles of applied biomedical instrumentation. New York: John Wiley & Sons.
33. Gillies, J. A. (Ed.). (1965). A textbook of aviation physiology. New York: Pergamon Press.
34. Glass, D. C., & Singer, J. E. (1972). Urban stress. New York: Academic Press.
35. Goldsmith, S. (1977). Designing for the disabled. Beaverton, OR: International Scholarly Book Service.
36. Grandjean, E. (1973). Ergonomics of the home. New York: Taylor & Francis.
37. Grandjean, E. (1969). Fitting the task to the man. New York: Taylor & Francis.
38. Grandjean, E., & Vigliani, E. (Eds.). (1980). Ergonomic aspects of visual display terminals. London: Taylor & Francis Ltd.
39. Grossman, S. P. (1967). A textbook of physiological psychology. New York: John Wiley & Sons.
40. Hammer, W. (1981). Occupational safety management and engineering. (2nd ed.). Englewood Cliffs, NJ: Prentice-Hall, Inc.
41. Harris, D. H., & Chaney, F. B. (1969). Human factors in quality assurance. New York: Wiley.
42. Howell, W. C., & Goldstein, I. L. (1971). Engineering psychology: Current perspectives in research. New York: Appleton-Century-Crofts.
43. Huchingson, R. D. (1981). New horizons for human factors in design. New York: McGraw-Hill.
44. Kahneman, D. (1973). Attention and effort. Englewood Cliffs, NJ: Prentice-Hall, Inc.
45. Kantowitz, B. H., & Sorkin, R. D. (1983). Human factors: Understanding people-system relationships. New York: John Wiley.
46. Kaufman, J. E., & Christensen, J. F. (Eds.). (1972). I. E. S. Lighting Handbook (5th ed.). New York: Illuminating Engineering Society.
47. Kelley, C. R. (1968). Manual and automatic control. New York: Wiley.
48. Kryter, K. D. (1970). The effects of noise on man. New York: Academic Press.
49. Legge, D. (Ed.). (1970). Skills. Baltimore, MD: Penguin Books, Inc.

50. Leithead, C. S., & Lind, A. R. (1964). Heat stress and heat disorders. London: Cassell.
51. McCormick, E. J. (1982). Human factors in engineering and design (5th ed.). New York: McGraw-Hill.
52. Mackworth, J. F. (1970). Vigilance and attention. Baltimore, MD: Penguin Books, Inc.
53. Mackworth, J. F. (1969). Vigilance and habituation. Baltimore, MD: Penguin Books, Inc.
54. Meister, D. (1971). Human factors: Theory & practice. New York: John Wiley & Sons.
55. Meister, D., & Rabideau, G. F. (1965). Human factors evaluation in system development. New York: John Wiley & Sons.
56. Murray, E. J. (1965). Sleep, dreams, and arousal. New York: Appleton-Century-Crofts.
57. Murrell, K. J. H. (1965). Human performance in industry. New York: Reinhold Publishing Company.
58. National Aeronautics and Space Administration SP-3006. (1973). Bioastronautics data book (2nd ed.). Washington, DC: NASA.
59. Netter, F. H. (1962). The CIBA collection of medical illustrations, volume 1, nervous system. Summit, NJ: CIBA Pharmaceutical.
60. Norman, D. A. (Ed.). (1970). Models of human memory. New York: Academic Press.
61. Olishifski, J. B., & McElroy, F. E. (1979). Fundamentals, of industrial hygiene (2nd ed.). Chicago: National Safety Council.
62. Parker, J. F., & West, V. R. (1973). Bioastronautics data book (2nd ed.). Washington, DC: NASA Scientific & Technical Information Office.
63. Parsons, H. M. (1972). Man-machine system experiments. Baltimore: Johns-Hopkins Press.
64. Poulton, E. C. (1972). Environment and human efficiency. Springfield, IL: C. C. Thomas.
65. Poulton, E. C. (1974). Tracking skill and manual control. New York: Academic Press.
66. Resmussen, J. (Ed.). (1973). Man in isolation and confinement. Chicago: Aldine.

67. Roebuck, J. A. (1975). Engineering anthropometry methods. New York: John Wiley & Sons.
68. Roebuck, J. A., Jr., Kroemer, H. E., & Thomson, W. G. (1975). Engineering anthropometry methods. New York: Wiley.
69. Salvendy, G. (Ed.). (1982). Handbook of industrial engineering. New York: John Wiley & Sons.
70. Schultz, D. P. (1965). Sensory restriction. New York: Academic Press.
71. Selye, H. (1978). The stress of life (2nd ed.). New York: McGraw-Hill.
72. Sidowski, J. B. (Ed.). (1966). Experimental methods and instrumentation in psychology. New York: McGraw-Hill.
73. Siegel, A. I., & Wolf, J. J. (1969). Man-machine simulation models. New York: Wiley.
74. Sinaiko, H. W. (Ed.). (1961). Selected papers on human factors in the design and use of control systems. New York: Dover.
75. Singleton, W. T., Fox, J. G., & Whitfield, D. (Eds.). (1973). Measurement of man at work: An appraisal of physiological and psychological criteria in man-machine systems. New York: State Mutual Books.
76. Sternbach, R. A. (1966). Principles of psychophysiology. New York: Academic Press.
77. Studies in human vigilance: An omnibus of technical reports. (1968). Goleta, CA: Human Factors Research, Inc.
78. Van Cott, H. P., & Kinkade, R. G. (Eds.). (1972). Human engineering guide to equipment design. Washington, DC: US Government Printing Office.
79. Venables, P. H., & Martin, I. (1976). A manual of psychophysiological methods. New York: John Wiley & Sons.
80. Welford, A. T. (1968). Fundamentals of skill. London: Methuen & Company.
81. Wickens, C. D. (1984). Engineering psychology and human performance. Columbus, OH: Charles E. Merrill Publishing Company.
82. Woodson, W. E. (1981). Human factors design handbook. New York: McGraw-Hill.
83. Woodson, W. E., & Conover, D. W. (1972). Human engineering guide for equipment designers (2nd ed.). Berkeley, CA: University of California Press.

APPENDIX C

BIBLIOGRAPHIES OF HUMAN FACTORS PUBLICATIONS



## BIBLIOGRAPHIES OF HUMAN FACTORS PUBLICATIONS

This is a list of bibliographies in human factors and related fields.

### A Bibliography on the Use of Information Theory in Psychology (1948-1966)

Prepared by E. M. Johnson, Institute for Psychological Research, Tufts University, under the sponsorship of the U.S. Army Human Engineering Laboratories, Aberdeen Proving Ground, MD, 1967. Contains 756 citations of work relevant to psychology in information theory.

### International Bibliography of Social and Cultural Anthropology

International Committee for Social Science Information & Documentation, 1970 (International Publication Service, New York). Companion to other UNESCO bibliographies in the social sciences. Lists scientific works from many countries, includes books, periodicals, and duplicated materials.

### Bibliography of Research Reports and Publications Issued by the Human Engineering Division April 1946-December 1970.

Compiled by Sandra A. Stevenson, Wright-Patterson Air Force Base, OH, 1972. Lists reports prepared by, or under the sponsorship of, the Human Engineering Division and the Training Research Division of the Aerospace Medical Research Laboratory. 1412 citations.

### A Bibliography of Reference Works in Human Factors Engineering

Prepared by the project staff, Paul G. Ronco, principal investigator, Human Engineering Information and Analysis Service, Institute for Psychological Research, Tufts University, 1963. For sale by the National Technical Information Service, Department of Commerce, Springfield, VA 22161.

Publications covered

1955-56	ONR Report	ACR-24
1956-57	"	ACR-32
1957-58	"	ACR-43
1958-59	"	ACR-55
1959-60	"	ACR-69
1960-61	"	ACR-75

Prepared under the joint sponsorship of the U.S. Army, Navy, and Air Force. Attempts to meet the information needs of personnel responsible for human factors considerations in the design and development of equipment and systems. Emphasizes, but not confined to, military interests. 3,490 citations and abstracts are provided in the 1960-61 volume.

APPENDIX D

DEPOSITORY LIBRARIES FOR U.S. PATENTS

## DEPOSITORY LIBRARIES FOR U.S. PATENTS

The patent depository libraries listed receive current issues of U.S. Patents and maintain collections of earlier issued patents. These reference collections are available for public use. Each of the patent depository libraries offers the publications of the patent classification system (e.g. The Manual of Classification, Index to the U.S. Patent Classification, Classification Definitions, etc.) and provides technical staff assistance in their use to aid the public in gaining access to information contained in patents. The scope of these collections varies from library to library, ranging from patents of only recent months or years in some libraries to all or most of the patents in some libraries to all or most of the patents issued since 1870, or earlier, in other libraries.

State	Name of Library	Telephone Number
Alabama	Auburn University Libraries Birmingham Public Library	(205) 926-4500 ext. 21 (205) 254-2555
Arizona	Tempe: Science Library, Arizona State University	(602) 965-7140
California	Los Angeles Public Library Sacramento: California State Library San Diego Public Library Sunnyvale: Patent Information Clearing House	(213) 826-7555 ext. 222 (916) 322-4572 (619) 276-5813 (415) 748-5580
Colorado	Denver Public Library	(303) 571-2122
Delaware	Newark: University of Delaware	(302) 734-2138
Georgia	Atlanta: Price Gilbert Memorial Library, Georgia Institute of Technology	(404) 894-4500
Idaho	Moscow: University of Idaho Library	(208) 885-8235
Illinois	Chicago Public Library Springfield: Illinois State Library	(312) 269-2865 (217) 792-5430
Indiana	Indianapolis-Marion County Public Library	(317) 269-1706
Louisiana	Baton Rouge: Troy M. Middleton Library, Louisiana State University	(504) 384-2570
Maryland	College Park: Engineering and Physical Sciences Library, University of Maryland	(301) 451-3137
Massachusetts	Boston Public Library	(617) 536-5400 ext. 265
Michigan	Ann Arbor: Engineering Transportation Library, University of Michigan Detroit Public Library	(313) 761-7494 (313) 833-1250
Minnesota	Minneapolis Public Library & Information Center	(612) 772-6577
Missouri	Kansas City: Linda Hall Library St. Louis Public Library	(816) 364-2000 (314) 241-7049 ext. 191, 192, 193
Nebraska	Lincoln: University of Nebraska-Lincoln, Engineering Library	(402) 472-4471
Nevada	Reno: University of Nevada Library	(702) 784-6779
New Hampshire	Durham: University of New Hampshire Library	(603) 861-1777
New Jersey	Newark Public Library	(201) 734-7415
New Mexico	Albuquerque: University of New Mexico Library	(505) 277-5141
New York	Albany: New York State Library Buffalo and Erie County Public Library New York Public Library (The Research Libraries)	(518) 271-5177 (716) 854-2777 ext. 287 (212) 974-4877
North Carolina	Raleigh: D. H. Hill Library, N.C. State University	(919) 337-3240
Ohio	Cincinnati & Hamilton County Public Library of Cleveland Public Library Columbus: Ohio State University Libraries	(513) 364-6030 (216) 623-7575 (614) 421-6290
Oklahoma	Toledo Lucas County Public Library	(419) 534-7700 ext. 1
Pennsylvania	Stillwater: Oklahoma State University Library Cambridge Springs: Alliance College Library Philadelphia: Franklin Institute Library Pittsburgh: Carnegie Library of Pittsburgh University Park: Patton Library, Pennsylvania State University	(412) 821-4770 (814) 394-2000 (215) 261-1000 (412) 681-4139 (814) 863-2807
Prince Edward Island	Providence Public Library	(416) 854-7777 ext.
South Carolina	Charleston: Medical University of South Carolina	(803) 724-2277
Tennessee	Memphis & Shelby County Public Library and Information Center	(901) 724-9970
Texas	Austin: McKinney Engineering Library, University of Texas College Station: Sterling C. Evans Library, Texas A & M University Dallas Public Library Houston: The Fondren Library, Rice University	(817) 257-4761 (409) 941-4777 (214) 744-4777 (713) 264-1777 ext.
Washington	Seattle: Engineering Library, University of Washington	(206) 546-7777
Wisconsin	Madison: Kurt E. Wendt Engineering Library, University of Wisconsin Milwaukee Public Library	(608) 262-7777 (414) 374-4777

All of the above-listed libraries offer CASSIS (Classification And Search Support Information System) which provides direct, on-line access to Patent and Trademark Office data.

APPENDIX E

DATA BASES RELEVANT TO HUMAN FACTORS

## DATA BASES RELEVANT TO HUMAN FACTORS

The following computerized data bases contain citations relating to human factors.

BIOSIS PREVIEWS (BioSciences Information Service, Philadelphia)

COMPENDEX (Engineering Index, Inc., New York)

DISSERTATION ABSTRACTS ONLINE (University Microfilms International, Ann Arbor, MI)

ENVIROLINE (Environment Information Center, Inc., New York)

ENVIRONMENTAL BIBLIOGRAPHY (Environmental Studies Institute, Santa Barbara, CA)

EMBASE (Excerpta Medica, Amsterdam, The Netherlands)

INSPEC (The Institution of Electrical Engineers, London)

ISMEC (Cambridge Scientific Abstracts, Bethesda, MD)

MEDLINE (National Library of Medicine, Bethesda, MD)

NTIS (National Technical Information Service, Springfield, VA)

PSYCALERT (American Psychological Association, Washington, DC)

PSYCINFO (American Psychological Association, Washington, DC)

SCISEARCH (Institute for Scientific Information, Philadelphia)

SOCIAL SCISEARCH (Institute for Scientific Information, Philadelphia)

SSIE CURRENT RESEARCH (National Technical Information Service, Springfield, VA)

**END**

**FILMED**

**2-85**

**DTIC**







